RADIO ACTIVITY IN BRIGHT E/SO GALAXIES: NGC 3894

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NGC 3894 is a 13th magnitude E/SO galaxy (de Vaucouleurs, de Vaucouleurs & Corwin 1976; Nilson 1973) whose recession velocity (Kelton 1980) implies a distance of 44 Mpc if H_o=75 km s^{-1} Mpc^{-1}. The radio emission from NGC 3894 is compact-core-dominated and, as shown in Fig. 1, this compact core is surrounded at 1.5 GHz by weak diffuse emission with a characteristic size of ∿2 arcmin (26 kpc) (Wrobel & Heeschen 1983). If the compact core radiates isotropically, then its radio luminosity is $\sim 10^{40}$ erg s^{-1}.

This galaxy was observed at 5 GHz with six stations of the US VLBI Network. The data were recorded in Mk II format, processed on the five-station CIT/JPL correlator and calibrated in the standard fashion. For details see Wrobel, Jones & Shaffer (1983). Fig. 2 shows a map of the galaxy, made using the MEM routine of S.F. Gull. The emission is basically double and is elongated at a position angle of ∿-47 degrees, which differs from the orientation of the galaxy's isophotal minor axis by ∿23 degrees. Two gaussian components were fit to the visibility data; these components are separated by ∿5 mas (1 pc), have strengths of ∿0.4 and ∿0.2 Jy, and have sizes of $\lesssim$2 mas ($\lesssim$0.4 pc) and ∿4 mas (∿0.8 pc) x $\lesssim$2 mas ($\lesssim$0.4 pc). Spectral decomposition of the pc-scale emission from NGC 3894, in combination with the X-ray detection reported by Biermann et al. (1981), would permit an investigation of the case for superluminal motion in this bright E/SO galaxy.

The radio emission from NGC 3894 is clearly well collimated on a pc scale (Fig. 2), but is amorphous in appearance on a 30-kpc scale (Fig. 1). The large scale radio emission may be inherently uncollimated, perhaps because of disruption of an intrinsically weak beam by its interaction with the host galaxy's tenuous interstellar medium (Jenkins 1982); and/or because of the interaction of NGC 3894 with its binary companion galaxy, NGC 3895 (Holmberg 1937). The recession velocity difference between these two galaxies is only 11 km s^{-1} (Kelton 1980) and their projected separation is about a galactic diameter (Dressel & Condon 1976; see Fig. 1).

R. Fanti et al. (eds.), VLBI and Compact Radio Sources, 257–258.

REFERENCES

Biermann, P., et al., 1981, Astrophys.J.(Letters), 250, L49
de Vaucouleurs, G., de Vaucouleurs, A., & Corwin, H.G., 1976 2RCBG
Dressel, L.L., & Condon, J.J., 1976, Astrophys.J.Suppl., 36, 53
Holmberg, E., 1937, Annals of the Observatory of Lund, No. 6
Jenkins, C.R., 1982, M.N.R.A.S., 200, 705
Kelton, P.W., 1980, A.J., 85, 89
Nilson, P., 1973, Uppsala General Catalog of Galaxies
Wrobel, J.M., & Heeschen, D.S., 1983, in preparation
Wrobel, J.M., Jones, D.L., & Shaffer, D.B., 1983, in preparation

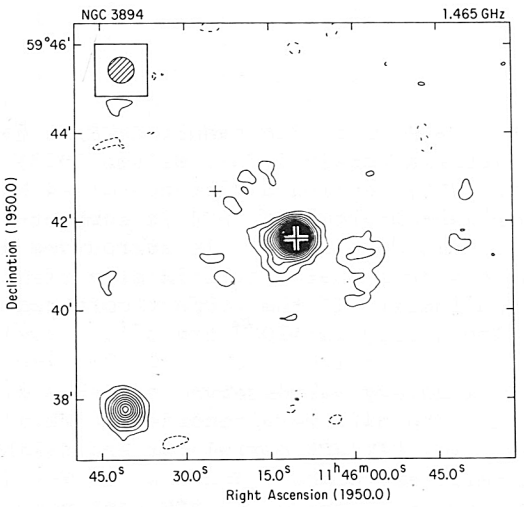

Fig. 1: A 1.5-GHz CLEANed map of NGC 3894. The contour interval is 2 mJy per beam area. Equally spaced contours are plotted; negative ones are dashed. The large cross marks the location of the compact core of NGC 3894, which was removed from the data prior to mapping. The small cross marks the optical position of NGC 3895. The source 6 arcmin SE of NGC 3894 has no optical counterpart visible on the PSS.

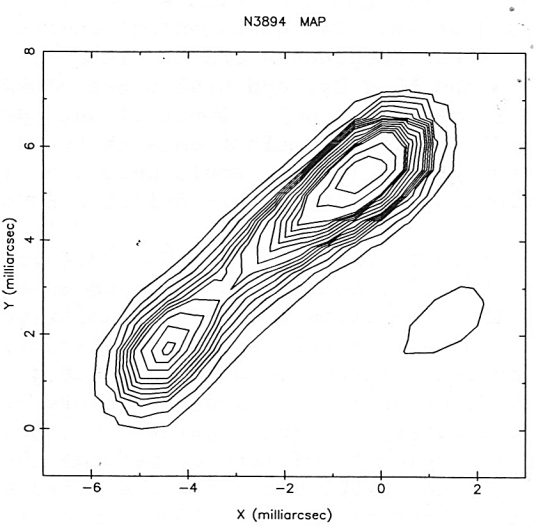

Fig. 2: A 5-GHz MEM map of NGC 3894. Contours at 2, 4, 6, 8, 10, 12, 14, 16, 20, 24, 28, 32, 36, 40, 60 and 80% of the peak intensity are plotted. The tick marks are separated by 1 mas (0.2 pc).

https://doi.org/10.1017/S0074180900078190 Published online by Cambridge University Press